TT-800J

Dedicated to All Tissue Grades

FILCON FABRICS

Integrated Warp Self Binding (WSB) Forming Fabric Design Enhances Performance

Introduction

Nippon Filcon, Co., LTD. specializes in manufacturing forming fabrics for tissue machines. Our company was one of the first in the world to develop a triple-layer WSB (Warp Self Binding) fabric. This revolutionary TT-800J forming fabric enabled us to apply and identify the benchmark shattering characteristics that brought this design to the forefront of many paper machine designs and grades. Since the TT-800J's inception in 2001, Nippon Filcon's Research and Development center has continually tested, innovated, and modified the design. This was a result of both customer requests and our own initiative to improve. The combination of "High Fiber Support" and "High Drainage Capability" offered by the TT-800J is reflected in benchmark performances on over 100 high-speed tissue machines worldwide. Besides excellent support and drainage characteristics, the TT-800J offers reductions in both "Pin Holes" and "Fiber Carry Back", thereby improving sheet formation. For these reasons our TT-800J has received high accolades from many customers.

The key feature of gap type tissue machines, such as Crescent Formers and Twin Wire Formers, is the ultra-fast formation of the sheet. As the furnish is injected via the headbox, the impingement is captured and formed in the fabric instantaneously. In this ultra-rapid forming process, key sheet quality properties, such as formation, tensile strength, porosity, and others, are established.

The desired design characteristics of forming fabric are "Very High Fiber Support" and "High Drainage Capability under hydraulic load". Results of our research efforts for achieving these two performance-specific attributes led to our TT-800J benchmark design.

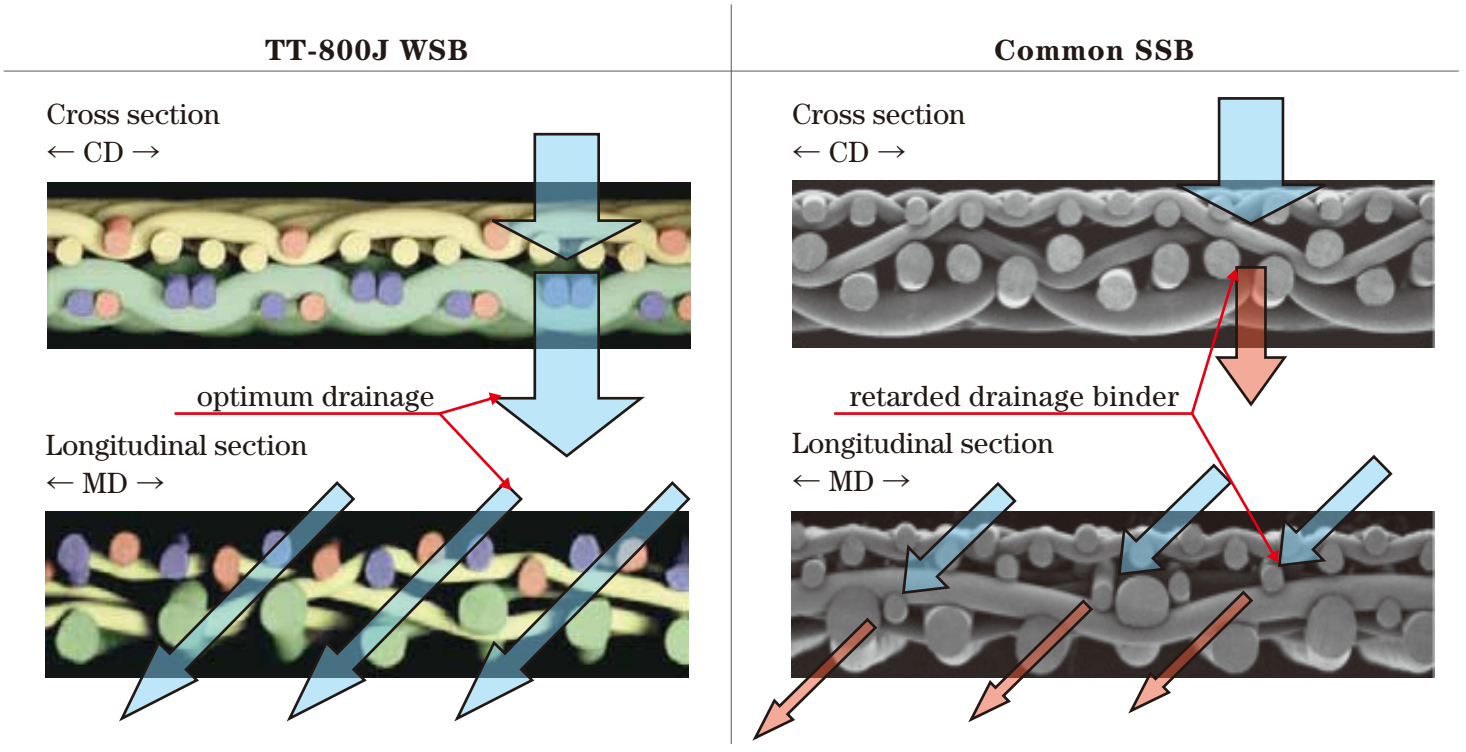
How WSB Design Works

Description of the WSB Structure - 1
"Better Drainage: Elimination of a drainage inhibitor (i.e. binding weft yarn, retarded drainage binder)"

In WSB designs, the warp is used as the binding yarn that brings together the sheet side and machine side layers required to form the triple layer weaving structure. Due to its weave structure, WSB significantly increases the degree of freedom in the integration of grade and property specific sheet side mesh structure and yarn diameter. Throughout our WSB design process, high drainage capability remains a priority.

In a common SSB (Shute Supporting Binder) type triple-layer fabrics, the shute (weft) is used as the binding yarn between sheet side and machine side layers. This obstructs drainage through the structure. This obstruction does not exist in WSB structures. Comparing the two designs, for equal thickness, drainage, and support characteristics, WSB structures offer increased and smoother drainage performance as illustrated in Fig. 1.

(Fig.1) Comparison of the Structure of WSB and SSB Designs



Description of the WSB Structure - 2
"Better Fiber Support: More sheet side shute yarns, correct pitch, and a long float yarn system"

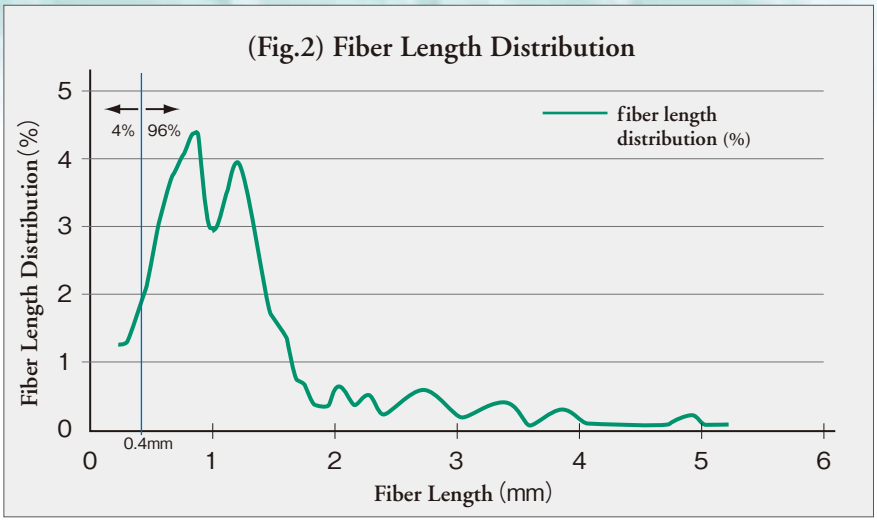
WSB design allows for a significant increase the number of shute yarns. One important result of this is enhances fiber support properties. In creating the TT-800J design, our R&D team focused on tissue grade, fiber length, and fiber orientation. From our collected data we were able to integrate specific properties, such as shute-yarn pitch, into the weave structure.

For LBKP, a key component of the furnish of tissue paper, the length of short fibers range from 0.25 - 1.5mm with average fiber length approximately 0.9mm (Fig. 2). Consequently, noticing that fibers >0.4mm occupy over 96% of all fibers including NBKP (long fibers), the Nippon Filcon R&D Team designed the weft yarn pitch such that the sheet surface can be formed over two weft yarns for fibers >0.4mm (Fig. 3). Fibers >0.60mm, which occupy over 80% of the total furnish, are formed over three shute yarns. This results in a tissue fabric structure with stable fiber support.

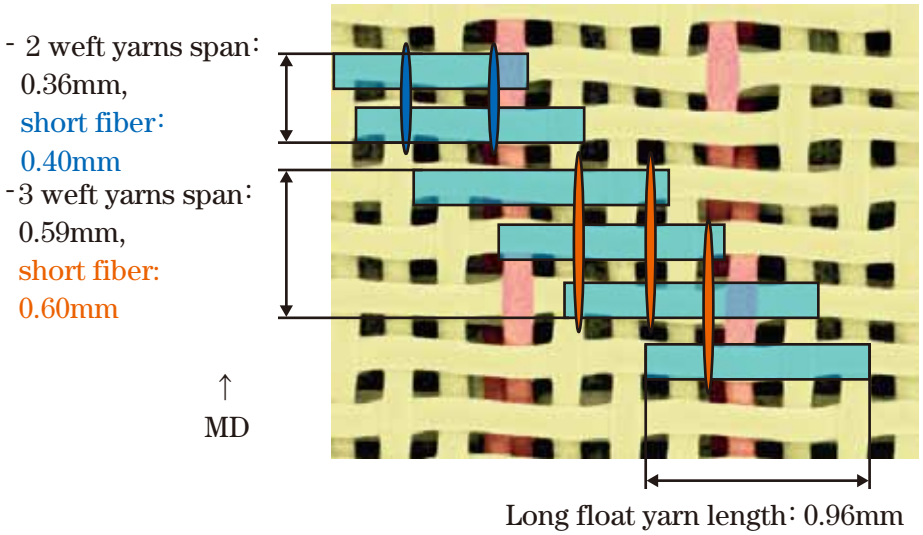
For the paper side of the fabric structure, our R&D team designed a long float yarn system (Length: 0.96mm). We used a ratio of one sheet side shute to three warp yarns (1/3 structure, also referred to as "Satin Weave"). This long float yarn system greatly improves MD fiber orientation (a key characteristic in tissue paper). This creates a huge advantage in terms of strength in the formed sheet.

In order to meet or exceed the ever increasing drainage and sheet quality demands, TT-800J fabric incorporates a combination of optimum weft yarn pitch (number of yarns) and a calculated long float yarn system. This makes it possible for short LBKP fibers to get onto the weft yarn in a stable manner (Bridge effect).

(Fig.2) Fiber Length Distribution



(Fig.3) Long Float Yarn System



TT-800J's Proven Performance

One of the world's leading tissue makers decided to switch from a conventional SSB (shute supporting binder) fabric to Filcon's TT-800J triple-layer WSB design for their Crescent Formers. Today, the TT-800J enjoys 100% market share for this paper company's key tissue machines. As mentioned earlier, Pin Holes and Fiber Carry Back represent significant factor that affect sheet formation. The following examples describe the success of the TT-800J with respect to these factors.

Example 1 – "Improvement in Sheet Formation Index: TT-800J design reduces Pin Hole count."

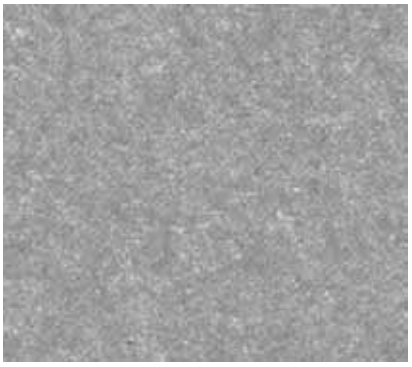
Extensive trials of both designs have shown that TT-800J's WSB structure results in formation index improvements of 35% while maintaining adequate drainage capability. These positive results on how the TT-800J has improved the sheet formation index (Fig. 4) on a variety of tissue machines has led to several production teams changing over to our TT-800J fabric.

Example 2 – "TT-800J Design Reduces Fiber Carry Back (FCB)"

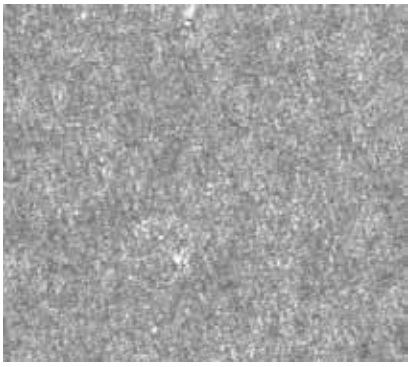
TT-800J design characteristics are a combination of low void volume, low obstruction, high drainage, and excellent fiber support. Data collected from several machines verified and proved that the percentage of FCB was significantly lower on machines running our TT-800J. This has been verified and proven in several other machines as well. Compared to other fabric designs, the TT-800J reduced FCB by 66 - 77% (Fig. 5). A reduction in FCB contributes to a more stable machine operation.

(Fig.4) Comparison of Sheet Formation, Tissue 11gsm
Crescent Former

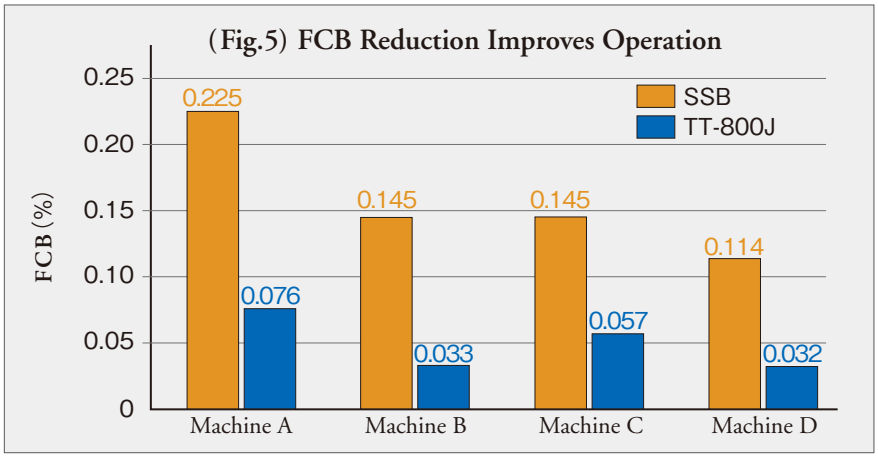
WSB Type TT-800J



SSB Type Triple layer



(Fig.5) FCB Reduction Improves Operation



Future R&D Initiatives

In an ongoing effort to meet the ever-advancing needs and expectations of our customers, Nippon Filcon Co., Ltd. continues to undertake R&D initiatives toward next generation fabric designs. Leveraging the advantages of TT-800J introduced here, we will continuously engage in the R&D of tissue fabrics, and launch them commercially.

Please contact us via phone, email, or our website at any time. We look forward to helping you achieve your machine objectives.

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